PREVENTING EMERGING INFECTIOUS DISEASES

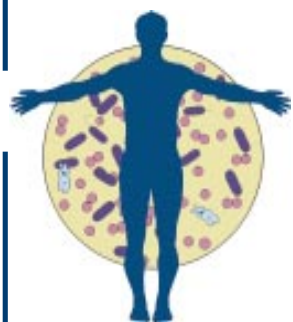
Addressing the Issues of Chronic Diseases Caused by Infectious Agents

A Strategy for the 21st Century

CDC

CENTERS FOR DISEASE CONTROL AND PREVENTION

ON CHRONIC DISEASE



"We used to think that chronic and infectious diseases were separate. But we gradually also learned that infectious diseases play a significant role in the emergence of chronic diseases. This may provide new opportunities to address and counter a significant public health challenge."

Dr. Gro Harlem Brundtland
Director-General
World Health Organization
January 26, 1998

EXAMPLES OF INFECTIOUS AGENTS ASSOCIATED WITH CHRONIC DISEASE

Organism	Chronic Condition
Borrelia burgdorferi (Tickborne Lyme disease)	Arthritis Neurologic disease
Sexually transmitted *Chlamydia trachomatis*	Reactive arthritis
Helicobacter pylori	Peptic ulcer disease
Hepatitis B virus	Chronic liver disease Liver cancer
Hepatitis C Virus	Chronic liver disease Liver cancer
Human herpesvirus-8	Kaposi's sarcoma
Human papillomavirus	Cervical cancer
Schistosoma haematobium	Bladder cancer
Trypanosoma cruzi	Chagas cardiomyopathy

INTRODUCTION

Infectious diseases are a continuing menace to all segments of society, regardless of age, gender, lifestyle, ethnic background, and socioeconomic status. They cause suffering and death and impose an enormous financial burden on society. Because we do not know what new diseases will arise, we must always be prepared for the unexpected. The Centers for Disease Control and Prevention (CDC) has recently released a plan, *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century*, which describes steps that we can take to move toward the realization of CDC's vision of a world in which all people join in a common effort to address today's emerging infectious diseases and prevent those of tomorrow.

The national emerging infectious disease plan targets specific categories of emerging infectious disease problems and particular groups of people who are at special risk. The nine target areas are antimicrobial resistance; foodborne and waterborne diseases; vectorborne and zoonotic diseases; diseases transmitted through blood transfusions or blood products; chronic diseases caused by infectious agents; vaccine development and use; diseases of people with impaired host defenses; diseases of newborns and pregnant women; and diseases of travelers, immigrants, and refugees. This booklet focuses on chronic diseases caused by infectious agents.

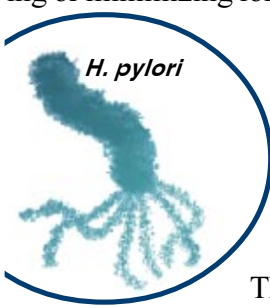
Public health activities for the nine target areas are organized under four broad, intersecting goals: surveillance and response, applied research, infrastructure and training, and prevention and control.

The goal of surveillance and response is to detect, investigate, and monitor emerging pathogens, the diseases they cause, and the factors influencing their emergence, and to respond to problems as they are identified. For applied research, the goal is to integrate laboratory science and epidemiology to better understand and optimize public health practices for the prevention and control of emerging infectious diseases. The goal of infrastructure and training is to strengthen the underlying foundation of public health surveillance, research, and programs by supporting the planning, delivery, and evaluation of public health activities and practices. Finally, the goal of prevention and control is to ensure prompt implementation of prevention and control strategies and enhance communication of public health information about emerging infections.

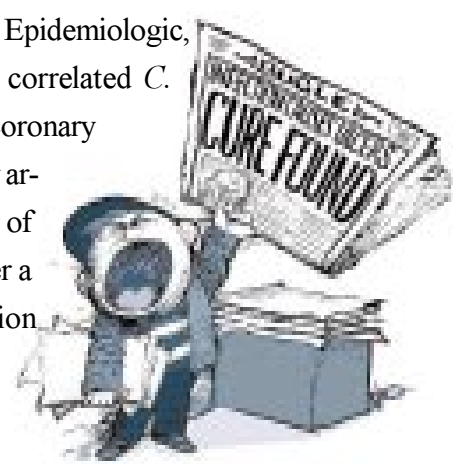
The Centers for Disease Control and Prevention Responds

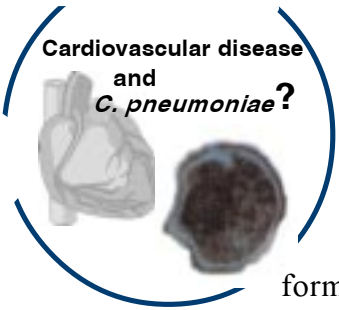
The CDC's National Center for Infectious Diseases (NCID) has developed specific public health activities that address the nine target areas. Many of the activities build on existing efforts or are in the planning stages. Others represent new efforts. These activities are described in individual booklets for each target area.

Several chronic diseases once attributed to lifestyle, genetics, or environmental factors are now known to be caused or exacerbated by infectious agents. These include stomach ulcers and certain types of cancer and arthritis. Evidence is mounting for other, still unproven associations between infectious agents and chronic diseases. These findings are prompting health professionals to rethink ways of preventing or minimizing long-term illness and disability. In the future, some chronic diseases may be treated with antibiotics, prevented by vaccines, or controlled by health education programs that enable susceptible people to avoid disease-causing microbes.



The discovery of *Helicobacter pylori* bacteria in most duodenal ulcers revolutionized medical management of this chronic disease. In most cases, ulcers can be cured following appropriate antibiotic therapy. On the heels of this remarkable finding, a strong but not yet proven association has been reported between the common respiratory bacterium *Chlamydia pneumoniae* and cardiovascular disease. Epidemiologic, pathologic, and laboratory studies have correlated *C. pneumoniae* infection with heart attacks, coronary artery disease, and strokes. Since coronary artery disease is responsible for almost 50% of all deaths in the U.S., determining whether a proportion might be attributed to infection is clearly worthwhile.



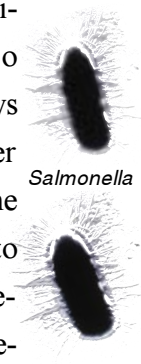


If future research confirms that a microbe plays a causative role in some heart attacks, antibiotics or vaccines might be used for prevention of certain forms of cardiovascular disease.

Infectious agents are known to cause a wide spectrum of chronic outcomes. For example, Lyme disease from the tickborne spirochete *Borrelia burgdorferi* can induce arthritis and neurologic disease. Hepatitis B and hepatitis C viruses can result in chronic liver disease and liver cancer. Hepatitis C virus is also associated with inflammation of joints (arthritis) and blood vessels (vasculitis), as well as with cryoglobulinemia (a blood disorder) and peripheral neuropathy (loss of sensation). At least 90% of invasive cervical cancers are associated with human papillomaviruses. Although much is known about these processes, research and guidelines for diagnosis, prevention, and treatment are still needed.

Many of the bacteria, parasites, and viruses linked to the development of chronic diseases are common throughout the world, but only some infected people develop severe outcomes. Genetic, behavioral, or environmental factors may influence the risk of disease. For example, while infection with foodborne and waterborne diarrhea–inducing bacteria such as *Salmonella*,

Shigella, *Yersinia,* and *Campylobacter* can cause reactive arthritis, people with the HLA-B27 gene are more likely to develop this potentially preventable condition. Education on ways to avoid infection with these bacteria might decrease the number of cases, particularly when targeted to persons likely to carry the HLA-B27 gene. In the years to come, scientists will continue to investigate potential infectious causes of chronic diseases, to determine which individuals are at risk, and to design disease prevention programs. CDC will play a major role in assessing new research findings, encouraging and conducting further research as needed, and disseminating treatment and prevention information to physicians and other health care providers.



Salmonella

NCID Activities To Address Chronic Diseases Caused by Infectious Agents

In collaboration with many private and public partners, CDC's National Center for Infectious Diseases will take the following steps to address the problem of chronic diseases caused by infectious agents.

Goal I: Surveillance and Response

- Document patterns of antimicrobial use for the prevention and treatment of chronic disease.
- Use surveillance data to evaluate the impact of vaccines, antimicrobial drugs, and other infectious disease interventions on the incidence and prevalence of certain chronic diseases.

Goal II: Applied Research

- Evaluate the relationships between infectious and chronic diseases using population-based data. This will involve building on existing surveillance systems and developing new procedures to gather and evaluate data.

- Identify the characteristics of hosts and microbes, the interaction between genetic and environmental factors, and human behaviors that determine the risk of exposure to infection with a particular organism and the likelihood of developing a chronic condition.

  - Determine the cellular and molecular mechanisms by which microbial infection can lead to chronic illness and disability in different populations.

- Determine whether there is a correlation between decreased prevalence of certain chronic diseases and increased use of vaccines, antibiotics, and other treatments for infectious diseases.

- Use population-based data to estimate what proportion of chronic illness might be avoided by the institution of infectious disease control measures.

- Work with public and private partners to identify, develop, evaluate, and deliver vaccines, antimicrobial drugs, and other interventions for the prevention or treatment of chronic outcomes of infection.

Goal III: Infrastructure and Training

- Foster collaboration among chronic disease experts, infectious disease specialists, epidemiologists, and geneticists, linking databases and research studies from the different disciplines.

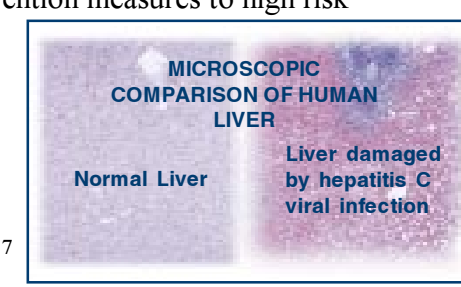
- Incorporate new information on the role of infectious agents in chronic disease into the curricula of schools of medicine, veterinary science, dentistry, biomedical science, nursing, and public health, as well as into continuing education programs for health professionals.

Goal IV: Prevention and Control

- In collaboration with many partners, develop and disseminate guidelines for the prevention and treatment of specific chronic diseases caused by infection.

- Target interventions and prevention programs toward people at high risk for developing chronic outcomes of infection.

- Determine the direct and indirect medical costs of chronic diseases caused or modified by infectious agents and evaluate the benefits of targeting prevention measures to high risk populations.



MORE INFORMATION

- Voice Fax for CDC (receive information on various diseases by voice message or printed fact sheets):
  1-888-CDC-FAXX (1-888-232-3299)

- Web site for the complete plan, *Preventing Emerging Infectious Diseases: A Strategy for the 21st Century:*
  www.cdc.gov/ncidod/emergplan

- Web site for the National Center for Infectious Diseases:
  www.cdc.gov/ncidod

- National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health: **www.niaid/nih.gov**

- Web site for Bacterial and Mycotic Diseases:
  www.cdc.gov/ncidod/dbmd

- Web site for Foodborne Diseases:
  www.cdc.gov/ncidod/dbmd/foodborn.htm

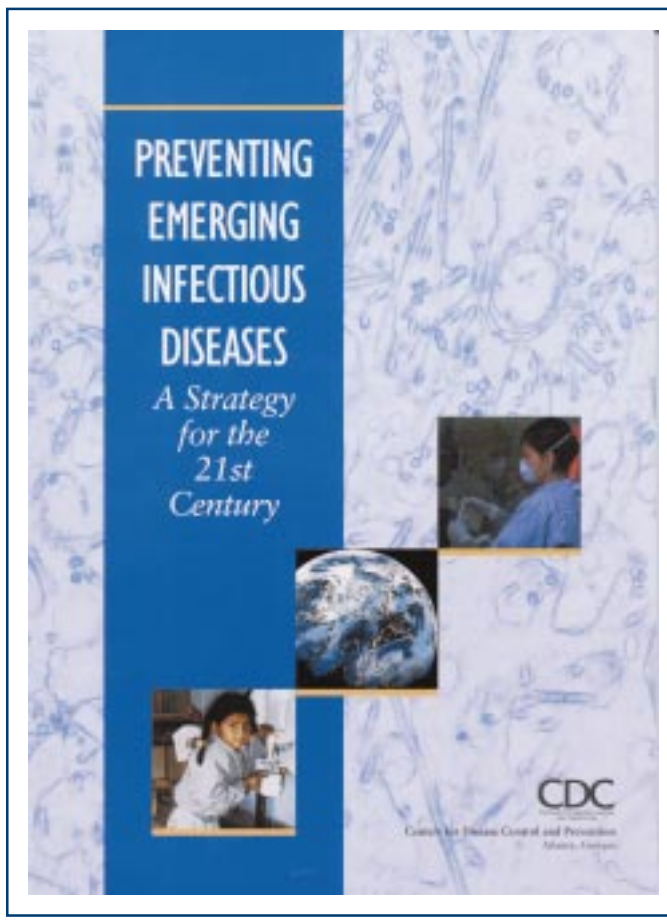
- Web site for Foodborne Disease Active Surveillance Network (FoodNet):
  www.cdc.gov/ncidod/dbmd/foodnet

- Web site for Health Information for International Travelers:
  www.cdc.gov/travel

- Web site for Parasitic Diseases:
  www.cdc.gov/ncidod/dpd

- Web site for Vectorborne Diseases:
  www.cdc.gov/ncidod/dvbid/dvbid.htm

- Web site for Viral and Rickettsial Diseases:
  www.cdc.gov/ncidod/dvrd



Copies of this 75-page plan are available from

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